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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: BRAD D. RUMSEY

§ Group Art Unit: 2841

Serial No.: 09/377,286

§ Examiner: K. Cuneo

Filed: August 18, 1999

§ Atty. Dkt. No.: MICT-0050-US

For: POSITIONING FLOWABLE
SOLDER FOR BONDING
INTEGRATED CIRCUIT
ELEMENTS

Board of Patent Appeals & Interferences
Commissioner for Patents
Washington, D.C. 20231

APPEAL BRIEF

Sir:

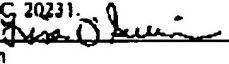
Applicant respectfully appeals from the final rejection mailed July 6, 2001.

I. REAL PARTY IN INTEREST

The real party in interest is the assignee Micron Technology, Inc.

II. RELATED APPEALS AND INTERFERENCES

None.

Date of Deposit: <u>11/01/01</u>
I hereby certify under 37 CFR 1.8(a) that this correspondence is being deposited with the United States Postal Service as first class mail with sufficient postage on the date indicated above and is addressed to the Board of Patent Appeals & Interferences, Commissioner for Patents, Washington, DC 20231.

Lisa O'Sullivan

III. STATUS OF THE CLAIMS

Claims 1-6, 10-12, 14, 16, 19 are pending. The rejection of each pending claim is appealed.

IV. STATUS OF AMENDMENTS

All amendments have been entered. Claim 9 was canceled in the Applicant's Reply to Paper No. 5. The other amendments in that Reply have been entered. Thus, the Examiner's continued rejection of claim 9 appears to be an oversight. Accordingly, the Applicant has treated claim 9 as canceled and not on appeal.

V. SUMMARY OF THE INVENTION

A bond assembly 10 includes a bond pad 14 coupled to a trace 12 extending away from the bond pad 14 in a first direction. The bond assembly 10 may be formed on a support which may be, for example, an integrated circuit die, an interposer, or a printed circuit board. While the bond pad 14 may be circular other shapes can be used as well. The bond pad 14 may be utilized in connection with packaging a variety of different integrated circuit devices.

A trace stub 16 extends away from the bond pad 14 in a second direction. Advantageously, the stub 16 may be made of the same material and may be of the same width and thickness as the trace 12. Moreover, the first and second directions may be diametrically opposed. Specification at page 5, lines 6-26; page 6, lines 1-3.

The region which may receive the solder may be greater than the size of the bond pad 14. Conveniently, the potential solder receiving area may be defined by a solder mask whose inward extent is marked by a solder mask edge 18. Thus, solder is masked away from the remainder of the device with the exception of the area inside the edge 18.

The solder mask edge 18 overlaps the trace stub 16. This provides greater tolerances and ensures that the stub 16 will extend beyond the solder mask edge 18. With the trace 12 and stub 16 configured as described above, if the solder attempts to wick in the direction of the trace 12 due to capillary action or any other reason, it will be pulled in the direction of the stub 16 by the action of the stub 16. Thus, the forces applied by the stub 16 counteract the wicking action of the trace 12. In some embodiments, it may be desirable to make the solder pad 14 relatively small so that the solder ball 20 is acted upon simultaneously by both the trace 12 and stub 16. Specification at page 6, lines 10-22.

VI. ISSUES

- A. Is Claim 1 Anticipated by Healy, et al.?
- B. Is Claim 3 Anticipated by Healy, et al.?
- C. Is Claim 10 Anticipated by Healy, et al?
- D. Is Claim 14 Anticipated by Healy, et al?

VII. GROUPING OF THE CLAIMS

For convenience, claims 1 through 2 and 4 through 6 may be grouped.

Additionally, claims 10 through 12 and 16 and 19 may be grouped.

VIII. ARGUMENT

A. Is Claim 1 Anticipated by Healy, et al.?

Healy, et al. (hereinafter "Healy") does not anticipate the invention of claim 1 because Healy does not apply any attractive force to solder placed on an interconnect pad. In contrast, claim 1 calls for a trace that applies an attractive force to solder placed on a bond pad and a trace stub that counteracts the attractive force applied by the trace.

A trace that is exposed within a solder deposition region applies an attractive force to solder placed within that region. Healy does not have a trace exposed within a solder deposition region; thus, a force cannot be applied by his trace. For example, in his process for assembling electrical conductors, Healy removes a portion of supportive insulating material that surrounds a printed circuit trace to expose an interconnect pad. See column 2, lines 18-22. A solder bead is then formed on the interconnect pad. See column 2, lines 25-30. Thus, Healy is exposing only the interconnect pad for solder deposition.

This conclusion is supported by examining Figures 1 and 2 of Healy. Figure 1 is a fragmentary view of an insulated printed circuit trace with a solder ball deposited

thercon. In the fragmented view almost all of the insulating material has been stripped away to show the circuit trace and interconnect pad. Figure 2 is a cross section of the printed circuit trace of Figure 1. In the cross sectional view, the solder deposition area surrounding the solder bead is well defined.

If the solder deposition area as defined in Figure 2 is imposed on the solder deposition area in Figure 1 (taking into consideration the change in perspective) it is then evident that Healy's region for solder deposition is only as great as the interconnect pad. Consequently, neither the trace nor the trace remnant is exposed in Healy's solder deposition region.

Stated another way, after removing the insulating material to create a region for solder deposition, Healy's circuit trace and trace remnant remain covered by the insulation. Because the trace and trace remnant are covered, the trace does not exert an attractive force on the deposited solder and the remnant does not counteract that force. As such, Healy does not teach an attractive force applied by a trace to solder placed on the bond pad and he does not teach a stub that counteracts that force.

In contrast, the trace and trace stub of claim 1 apply an attractive force and counter attractive force respectively, on solder placed on a bond pad. These forces arise because unlike Healy, the region receiving solder is greater than the size of the bond pad. Accordingly, the portions of the trace and stub that are proximate to the bond pad are not

covered by insulating or any other material. Thus, solder deposited on the pad is subject to pull in the direction of the trace and trace stub.

The structural difference between the claimed invention and Healy are significant. Small differences in structure, that lead to results not intended and not appreciated do not constitute anticipation. *See, Eibel Process Co. v. Minnesota & Ontario Paper Co.*, 263 U.S. 45, 66 (1923). Eibel obtained a patent that claimed a small change made in paper making machinery. This change was to merely elevate a part of the machinery to increase the efficiency of the machinery. Albeit this change was slight, the Court found that it was not anticipated and that "accidental results, not intended and not appreciated, do not constitute anticipation." *Id.*

Similarly, the result of the structural difference between the claimed invention and Healy was not intended nor appreciated by Healy. Accordingly, the claimed invention is not anticipated by Healy. Absent the alleged anticipation the rejection should be reversed.

B. Is Claim 3 Anticipated by Healy, et al.?

Healy does not anticipate the invention of claim 3 because Healy's bond pad is defined by the surrounding insulation. Claim 3 depends from claim 1 wherin claim 1 includes a bond pad. Claim 3 further defines the bond pad to be a non-solder mask

defined bond pad. In contrast, Healy provides a bond pad that is clearly defined by the surrounding insulation.

As previously explained, Healy removes a portion of the supported insulating material to expose only the interconnect pad. See specification, lines 18-22 and Figures 1 and 2. Thus, Healy's bond pad is defined by the surrounding insulated material. If defined by the surrounding insulating material, Healy's pad can not be a non-solder mask defined pad. Accordingly, claim 3 can not be anticipated by Healy. Thus, the rejection of claim 3 should be reversed.

C. Is Claim 10 Anticipated by Healy, et al?

As with claims 1 and 3, Healy does not anticipate claim 10. Claim 10 calls for a trace coupled to a bond pad and extends away from the bond pad and an element adapted to counteract an attractive force applied by the trace to solder placed on the bond pad. Healy does not disclose a system that applies attractive forces to solder placed on the bond pad.

As previously explained, the solder deposition region disclosed by Healy is only as great as the interconnect pad. Thus, the trace and the trace remnant shown in Figure 1 of Healy are covered by surrounding insulative material as shown in Figure 2. As such, solder placed on the interconnect pad is not subject to pull due to an attractive force by the trace or trace remnant. Without the presence of an attractive force, or a counter

attractive force, claim 10 does not read on Healy. Thus, Healy is different from the system claimed in claim 10, and does not anticipate the invention, as claimed. Therefore, the rejection of claim 10 is not applicable and should be reversed.

D. Is Claim 14 Anticipated by Healy, et al?

Claim 14 depends from claim 10, which includes a bond pad. Claim 14 includes a solder mask that defines a solder mask opening around the bond pad. Further, an element extends from the bond pad and through the solder mask opening. Thus, claim 14 provides for a solder mask edge that defines the outer edge of the solder deposition region, which is greater than the bond pad. In other words, the solder mask defines the bond pad. In contrast, Healy's insulative material defines the bond pad. Thus, there is no opening around his interconnect pad. Without an opening around the interconnect pad a trace remnant can not extend from the pad through the opening.

As previously explained, Healy's solder deposition region is only as great as the interconnect pad. Thus, Healy has an opening for solder deposition that exposes the interconnect pad and nothing more. As a result, the trace and the remnant are not within an opening around the bond pad and therefore can not extend through the opening.

In contrast, claim 14 provides for an opening that is defined by a solder mask wherein the opening is greater than the size of the bond pad. Accordingly, the element

and the trace are within the opening that defines the solder deposition region. As a result, the trace element extends from the bond pad and through the opening.

In sum, because Healy's solder deposition region is only as great as his interconnect pad the trace remnant does not extend from the bond pad and through an opening around the interconnect pad. Accordingly, Healy does not anticipate claim 14 and the rejection should be reversed.

IX. CONCLUSION

For the reasons outlined above, the rejection of the claims in this application should be reversed.

Respectfully submitted,

Date: 1/19/01



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APPENDIX OF CLAIMS

The claims on appeal are as follows:

1. A bond pad assembly comprising:
 - a bond pad;
 - a trace that applies an attractive force to solder placed on the pad, said trace coupled to said pad and extending away from said pad in a first direction; and
 - a trace stub to counteract the attractive force applied by the trace, said trace stub coupled to said pad and extending away from said pad in a direction other than said first direction.
2. The assembly of claim 1 wherein said stub extends diametrically away from said trace.
3. The assembly of claim 1 wherein said bond pad is a non-solder mask defined pad.
4. The assembly of claim 1 wherein said stub has a thickness and width substantially equal to the thickness and width of said trace.
5. The assembly of claim 1 including a solder mask which defines a solder receiving area proximate to said bond pad.
6. The assembly of claim 5 wherein said stub extends outwardly into said solder mask.

10. A bonding system comprising:
 - a bond pad;
 - a trace coupled to said bond pad and extending away from said pad; and
 - an element adapted to counteract an attractive force applied by the trace to solder placed on the bond pad.
11. The system of claim 10 wherein said element includes a trace-like portion extending away from said bond pad in a direction opposite to the direction that said trace extends away from said bond pad.
12. The system of claim 11 wherein said trace-like element has the width and thickness of said trace.
14. The system of claim 10 including a solder mask defining a solder mask opening around said bond pad, said element extending from said bond pad and through said opening.
16. The system of claim 10 wherein the attractive force applied by the trace to said solder arises from said trace being coupled to and extending away from said bond pad, said element adapted to emulate said trace.
19. The system of claim 10 wherein said element is configured symmetrically to said trace.